mysteries. Their normal function would seem to be aeration and movement of the soil similar to that of earthworms.

TEA ESTATES INDIA LTD.,
POST BOX NO. 13,
COIMBATORE,
March 15, 1954.

J. L. H. WILLIAMS

50. LAND LEECHES

In answer to a few of the queries asked by Mr. Bertram E. Smythies in Vol. 51, No. 4 of the *Journal*, I have consulted my notes taken during 1944 and 1945 while working near the Ledo Road, in Upper Burma.

The maximum number of bites on my person on any one day was 29 in late August 1944, at Tingkak Sakan; the most feeding leeches removed at any one time from me was 9, in early May 1945, at Loglei. In general the vast majority of bites were just above the shoe tops or in the popliteal fossa. I recall being bitten only twice above the belt and these both were in the axilla.

I remember one particular bite on a man working with me, September 1944, at Warazup. It was inside the mouth on the cheek; fortunately the leech was small and easily removed by common salt. This man was a pipesmoker, who put his pipe down anywhere, and I have always assumed that the leech was carried into his mouth on the pipe stem. Normally leeches avoid nicotine, so there may well be a better explanation of this bite.

The soldiers usually removed leeches by heating their anterior end with a lighted cigarette. The leech would attempt to move away from the heat and the soldier would flick it off. The insect repellent issued by the army worked well, but most of the men objected to its texture and to the slime that the leech invariably produced when doused.

As I recall leeches fed all day long in rainy weather but were generally most active in the morning. On rainless days, leeches usually stopped hunting at about 9:30 or 10:00 a.m. Since I was usually in camp after dark, I do not have the time when they start to feed, but men on night duty reported that they were bitten soon after dark. Leeches seemed to me to avoid direct sunlight.

One June morning, while hunting for coecilians, near Shingbwiyang, I collected 37 leeches in about an hour. They were most of them just under the first layer of leaves on the forest floor. I have looked for leeches in a number of places during the dry season without success. Neither did I find them after a January rainy spell in the teak forests east of Bhamo.

I do not recall seeing leeches much higher than about three or four feet off the ground, but at that level they were quite common. This may be because, in that region the underbrush was not very tall. It appeared to me that leeches tended toward the periphery of plants at their maximum diameter. You would often see them bowed upward and outward along the leaf margins.

From my experience I am inclined to be very sceptical of the rain-of-leeches stories. It is quite probable that leeches have fallen

upon their prey, but I have not seen it. If a leech fell from any distance I am certain that it would bounce or roll off its target before getting a tail-hold.

Leeches, while 'perched' on leaf margins, are ideal subjects for tropistic experiments. If the hands are held on either side of a leech while so perched, it will invariably turn to the nearer hand except when there is a breeze; then it will turn to the windward hand. If the windward hand is withdrawn and the leeward hand approached, the leech will turn to the leeward hand when the distance ratio is roughly 1:4. I repeated these tests some twenty times and several of the soldiers did them for amusement as well; the results were uniform. There may be an illumination factor in target selection, but without careful control a guess is as much as I dare make.

I feel certain that leeches locate their prey by a chemical sense of some kind. The two hand tests and the distances over which they locate their prey—distances, unfortunately, that I have no record of —leave little room for question. Temperature as such I think may be ruled out as the source of attraction by the distance over which it acts. Radiations of any type would hardly give a 1:4 ratio in a light breeze. Moisture as the attractant may be ruled out by the humidity of their microclimate. Sound waves do not fit the pattern of the two hand experiment. A chemical perception of some kind is to me the only permissible explanation of this phase of leech behaviour.

Arabian America Oil Co.,
Dhahran, Saudi Arabia, R. S. MATHEWS
April 25, 1954.

51. 'NWE-SHIN' OR 'LIVE CREEPER'

Reference your Miscellaneous Notes in Vol. 52, No. 1, 'Hunter's Sugar' by W. S. Thom, he ended with a para about '*Nwe-Shin*' or live creeper. His version of this creeper with mobile powers which give rise to its local name 'live creeper' sounds rather a 'tall' story. I have indeed come across the 'Nwe-Shin' in streams (prewar) in the Namme Reserve of Mong Mit Division in the Northern Shan States and (last year) in the Indawgyi Reserve in the Myitkyina Division of North Burma. This creature (Phylum Annelida), for I am sure it belongs to the animal kingdom, is as he describes like 'a piece of smooth green coloured creeper' but nothing like as thick as an ordinary pencil. Those I came across were about $\frac{1}{8}$ in. thick and from ten to eighteen inches long. They wriggled rather feebly in the slack water of the stream, and when enclosed in a bottle of water overnight died (I put it down to aspyxiation). Some were observed on land in a partially dried state and when put into the water came to life again. They certainly resemble the aerial roots of a certain creeper that dangle from the leaf-canopy overhead in dense forest, but I have yet to see such a creeper, when cut and thrown into water, come to life and swim off like a live snake!

Burma Forest School,
Maymyo (Burma), H. G. HUNDLEY
August 23, 1954.